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Title: Strategies for improving medication safety in hospitals: evolution of clinical pharmacy services

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ABSTRACT

Background: Medication safety risks are the most important preventable factors jeopardizing patient safety. To manage these risks, extending pharmacists' involvement in patient care and patient safety work has been systematically addressed in patient safety initiatives since the early 2000s.

Objective: To explore the extent and range of clinical pharmacy services in Finnish hospitals to promote medication safety: 1) in 2011, when the first National Patient Safety Strategy, the new Health Care Act and the Medicines Policy 2020 had been recently enacted; and 2) five years later in 2016.

Methods: The study was conducted in 2011 and 2016 as a national online survey targeted to hospital pharmacies (n=24) and medical dispensaries (n=131 in 2011; n=28 in 2016). The questions were analyzed using descriptive statistics and qualitative content analysis.

Results: Overall response rate was 60% in 2011 and 52% in 2016. Clinical pharmacy services were provided by 51% of the responding units in 2011, whereas by 85% in 2016. The reported number of clinical pharmacists had increased during the five years. The most notable increase in reported tasks occurred in conducting medication reconciliations (+63% increase in the number of providing units). By 2016 pharmacists had extended their tasks particularly towards system-based medication safety work: e.g. developing instructions for medication-use (91% of the responding units), creating and updating medication safety plans (87%) and using medication error reports in developing the process of medication use safer (78%). Pharmacists' participation in long-term continuing education became more common in 2016, which was perceived as helpful in extending their responsibilities to improve medication safety.

Conclusion: Pharmacists' involvement in patient care and system-based medication safety work was reported to become more common in Finnish hospitals during 2011-2016. This development is in line with patient safety policy initiatives and its impact on patient care outcomes should be followed up.

1. INTRODUCTION

Pharmacotherapy is one of the most common interventions in healthcare. Even effective, pharmacotherapies used in hospitals are often challenging to manage: approximately 6% of hospitalized patients experience an adverse drug event during their hospital stay.¹ In many cases, medications used in hospitals are parenterally administered, which increases a risk for medication errors (MEs).²⁻³ Furthermore, hospitalized patients are often unstable and need intensive and continuous monitoring, as well as fast clinical decision-making. System-based patient safety work has shown that medication errors are one of the most important preventable factors jeopardizing patient safety in healthcare.⁴⁻⁷ To be safe, pharmacotherapies used in hospitals require well-designed care processes both for individual patients and at the organizational level. Therefore, international patient safety initiatives prioritize strategies and policies to improve safe medication practices.⁴⁻⁷ These strategies have emphasized the creation of a safety culture, learning from medication errors through reporting systems and development of preventive actions for prospective risk management.

The Council of Europe was among the first ministry level institutions in Europe to establish recommendations to improve medication safety as part of patient safety in 2006.⁵⁻⁶ These medication safety recommendations focused on safety culture and considered e.g. early detection of adverse drug events, the setup of medication error reporting systems, strengthening awareness and learning of professionals, introducing electronic prescribing, improving naming, labelling and packaging, and improving medicines information practices. Council of Europe has continued its long-term commitment to medication safety work under the European Directorate of Quality of Medicines (EDQM) with a program to create pharmaceutical care indicators.⁸⁻⁹ Also, European Union (EU) and its stakeholder organizations have coordinated efforts to encourage the member countries to take actions to improve patient and medication safety.¹⁰⁻¹¹ Most lately EU integrated medication safety with drug safety, i.e. pharmacovigilance initiatives through a Directive enacted in 2012.¹²

All the patient and medication safety initiatives, recommendations and policies over the years have been based on interprofessional team work principles.⁴⁻⁷ As pharmacists as healthcare professionals are specialized in pharmacotherapies, they have been encouraged to take more responsibility of managing safe medication practices in different settings. E.g. EDQM invited European governments and policy-makers to implement the principles and working methods of clinical pharmacy and pharmaceutical care in their national healthcare systems.⁸⁻⁹ Clinical pharmacy is an area of pharmacy concerned with the science and practice of rational and appropriate medication use.¹³⁻¹⁴ According to the principles of pharmaceutical care, pharmacists are expected to ensure the quality and safety of medication therapies in patient care, with

emphasis on collaborative care and patient interaction.¹⁴⁻¹⁷ Even though pharmaceutical care and patient-centered clinical pharmacy services have been shown to improve quality, safety and efficiency of care and reduce its costs,¹⁸⁻²¹ their diffusion to many healthcare systems, e.g. in Europe,²² has been slow. Growing evidence of patient safety risks cumulating from medications, also in Finnish healthcare, have created a need to develop new strategies and policies to manage these risks.²³⁻²⁶ The aim of this study was to explore the extent and range of clinical pharmacy services in Finnish hospitals to promote medication safety: 1) in 2011, when the first National Patient Safety Strategy²⁷, the new Health Care Act²⁸ and the Medicines Policy 2020²⁴ had been recently enacted; and 2) five years later in 2016.

2. MATERIALS AND METHODS

2.1. Context of the study

In Finland municipalities are responsible for organizing primary healthcare services, which are mainly provided by municipal health centers.²⁸ The secondary special healthcare is organized by central hospitals, each of them located in their own hospital districts (n=21) covered by federations of municipalities (including Åland). For special tertiary healthcare, Finland is divided into five responsibility areas, each with a university hospital. Private healthcare services complete the public health services. Hospital pharmacies (n=24) are located in university hospitals, central hospitals and in some larger health centers with inpatient wards. Medicine dispensaries supply medicines in smaller inpatient healthcare units in the public and private sectors. Some of them operate independently as part of the healthcare organization and others in the public sector operate under hospital pharmacies. The number of medicine dispensaries had remarkably decreased from 94 to 55 between 2011 and 2016 (Finnish Medicines agency, unpublished statistics 2012), while the number of hospital pharmacies (n=24) remained the same.²⁹⁻³⁰ The number of independent medicine dispensaries decreased because of a strategic trend to merge small medicine dispensaries into larger hospital pharmacies in the region. The goal of the merges was to release resources from administrative and logistic work to be reallocated to more patient care oriented clinical pharmacy services.

Clinical pharmacy as a concept was defined in Finland in 2010 for initiating a national specialization program for hospital and health center pharmacists with special reference to systems approach to patient and medication safety.³¹ The following definition was constructed based on an inventory of definitions by key international clinical pharmacy organizations: *Clinical pharmacy is a health science focusing on pharmacists' contributions to medicines optimization and health promotion. Clinical pharmacy emphasizes rational medicine use and promoting it, development and evaluation of pharmaceutical services, medicines management, and medication safety. Prerequisites for clinical pharmacy are interprofessional collaboration*

and collaboration with patients. Clinical pharmacy covers all social and healthcare settings in inpatient and outpatient care where pharmacotherapy is part of the care of the patients. The concept “ward pharmacy” has a longer history in Finland and it has been defined as “a medication management at hospital wards conducted by pharmaceutical staff”.²⁴ The ward pharmacy as a concept reflects the long-time core mission of Finnish hospital pharmacists in the management of medicines supply and logistics.³²⁻³⁴ The first clinical pharmacy posts in Finnish hospitals were established in the end of the 1980s, but the development of clinical pharmacy services has been slow.³³⁻³⁴ Moreover, pharmacy education in Finland, as in many other countries, has not prepared pharmacists to be involved in patient care and to provide clinical pharmacy services as a part of the healthcare team.³⁵⁻³⁶ The first steps towards more systematic training in pharmacists’ clinical skills were taken through national accreditation training for comprehensive medication reviews which started in 2005.³⁷ It has had spillover effects on undergraduate training, specialization training of community and hospital pharmacists, and practice development.

In Finland, increasing pharmacists’ involvement in patient care and assuring safe medication practices in hospitals was recommended for the first time in 2006 when Ministry of Social Affairs and Health guided each healthcare unit to set up a medication safety plan, i.e., an organization-based medication risk management plan.²³ The plan should have a description of the system, processes, resources and persons in charge for safe pharmacotherapies. The plan became obligatory as part of the patient safety risk management plan in 2011 when the new Health Care Act was enacted.²⁸ Implementation of these patient and medication safety initiatives were supported by the National Patient Safety Program in 2011-2014.²⁷ The Medicines Policy 2020, established in 2011, also supported the same strategic objectives with special emphasis on the pharmaceutical sector’s contributions to safe and rational pharmacotherapy.²⁴ The recommended actions have been conveyed through international recommendations, particularly by The Council of Europe,⁵⁻⁶ The European Union,¹⁰⁻¹¹ WHO,³⁸ research data derived from reporting systems for patient safety incidents,^{25,39} and benchmarking best practices.

2.2. Study design and method

This study was conducted as a national online survey targeted at all hospital pharmacies and medicine dispensaries serving inpatient healthcare units. The survey was first conducted in 2011 and repeated in 2016 for a follow-up of developments.

2.3. Development of the survey instrument

Six semi-structured theme interviews were conducted to develop the survey instrument in 2011. The interviewees were selected by purposive sampling to present the widest range of clinical pharmacy services in Finnish hospitals at that time. Recruitment was facilitated by the Finnish Pharmacists’ Association and

the Faculty of Pharmacy, University of Helsinki, Finland. Interviewees were working on the wards or as leaders of clinical pharmacy teams in different hospitals and health centers with inpatient wards. In addition to the interviews, information gathered from practice development projects in Finland and international scientific literature was used for developing the survey instrument. Definitions for clinical pharmacy,¹³⁻¹⁴ pharmaceutical care,¹⁵⁻¹⁷ and patient and medication safety from systems approach⁵⁻⁶ were used to outline the range of services included in the structured list of the survey instrument. Medication safety and prospective risk management aspects were emphasized in the selection of the tasks and services.^{5-6,40-41} In order to get a better understanding of the evolution of pharmacists' contributions to patient care and medication safety a detailed list of tasks (n=29) was developed. The more detailed list was expected to increase sensitivity of the measures compared to using general statements of services, such as counseling patients on their medications, or checking and reviewing medications. As Finnish hospital pharmacists do not have a long history in providing other than logistic services, we intentionally included also clinical tasks that are not so "advanced" but reflect merely early phase of clinical pharmacy service implementation in the 1960s, e.g., provision of drug information to ward personnel. These services are still an important part of the infrastructure needed for medication safety and risk management.⁴¹ They also can perform as indicators for transition from early phase clinical pharmacy services towards more advanced and sophisticated ones. The list of tasks and services included in the survey is presented in Figure 3.

The final survey instrument was divided into three parts: 1) questions gathering background information on the respondent's healthcare organization; 2) questions for hospital pharmacies/medicine dispensaries providing clinical pharmacy services to inpatient care; and 3) questions for non-providers of clinical pharmacy services (Figure 1). The questions employed a five-point Likert scale, multiple choice questions and open fields for responses. Structured questions were used to gather the background information of the responding units, the current range of clinical pharmacy services provided, how they are planned and managed, and the evaluated benefits and outcomes (if studied in the responding unit) of these services. The survey instrument was piloted for content and face-validity with three clinical pharmacists from separate organizations. Time required for responding to the survey varied between 10-40 minutes depending on the range of the services provided by the respondent's organization.

The same online survey instrument was utilized in the follow-up survey in 2016 (Figure 1). Most of the questions remained the same, but some of the open-ended questions were changed to structured questions in 2016. The structured list of clinical pharmacy services was updated (Figure 3) for the survey in 2016 by adding 12 services implemented after the first survey in 2011. Furthermore, the updated list also contained such clinical pharmacy services that were set as a goal by the European Association of Hospital Pharmacists (EAHP) for delivering hospital pharmacy services in every European health system.⁴² In 2011,

the respondents were asked to submit any available reports on the studies they had conducted to show the outcomes of the services they provided. Reports received in 2011 (n=9) were used to develop a structured list of benefits and outcomes to the 2016 survey (see Figure 6).

2.4. Conducting the survey in 2011 and 2016

The online survey was conducted in 2011 and in 2016. The survey was e-mailed to all chief hospital pharmacists (n=24 in 2011 and 2016) and all managers of the medicine dispensaries (n= 94 in 2011 and n=55 in 2016). The e-mail addresses of the chief hospital pharmacists were received from the Faculty of Pharmacy, University of Helsinki. The managers of the medicine dispensaries were contacted using the membership register of The Finnish Pharmacists' Association provided by the officer of the Association. While there were 55 managers of medicine dispensaries in 2016, only the managers of the independent ones, not managed by hospital pharmacies, were invited to participate in the survey (n=28 out of 55 managers). This is because information on clinical pharmacy services provided by the non-independent medicine dispensaries were covered by the responses from the hospital pharmacies under which they operated. The chiefs and managers were asked to forward the survey to the pharmacists in their organization who provided or managed clinical pharmacy services so that there would be one coordinated response per organization. The survey was planned to be open for two weeks and two reminders were sent during that period. After the period, a third e-mail reminder was sent, and the survey was extended to be open for one more week for responses.

2.5. Data analysis

The structured questions were analyzed with descriptive statistics using Microsoft Excel.⁴³ The responses from hospital pharmacies and medicine dispensaries were analyzed separately to identify differences in the operations of these units. Likewise, in some questions the responses from hospital pharmacies were divided into university hospitals, central hospitals and community hospitals to identify differences between these hospital pharmacies. The open-ended questions were analyzed by applying a conventional content analysis.⁴⁴ Systems approach to human errors and risk management as illustrated in the Reason's Human Error Theory was applied to illustrate reported tasks where clinical pharmacists contributed to medication safety at all stages of the medication-use process.⁴⁵

2.6. Study ethics

According to the scientific ethical guidelines in Finland, an ethics committee approval was not required for a survey without patient data.⁴⁶ The survey participants were informed that the participation was voluntary and responding to the survey implied an informed consent. The invitation to participate in the survey was sent by e-mail, including a cover letter with a description of the study and a link to an online questionnaire.

Detailed information of the responding organizations was not asked for, only whether the unit was a hospital pharmacy or a medication dispensary and the county in which the unit was located. All responses were confidential.

3. RESULTS

3.1. Survey participants and coverage

In 2011, the responses were received from 20/24 of the hospital pharmacies (83%) and 51/94 medicine dispensaries (54%), yielding an overall response rate of 60% (n=71/118). In 2011, the hospital pharmacies were not asked if they were university, central or community hospital pharmacies, but the total coverage was 83%. In 2016, 18/24 of hospital pharmacies (75%) and 9/28 of the independent medicine dispensaries (32%) responded to the follow-up survey resulting in an overall response rate of 52% (n=27/52, Figure 2). Among the respondents in 2016 were all five university hospital pharmacies (100%), 13 central hospital pharmacies and one community hospital pharmacy (Figure 2) covering 74% (n=14/19) of the central and community hospital pharmacies, which provide clinical pharmacy services to the largest inpatient healthcare units.

3.2. Reported clinical pharmacy services in 2016 compared to 2011

The relative number of responding units providing clinical pharmacy services increased during 2011-2016 from 51% to 85% (Table 1). Thus, the proportion of the units reporting non-provision of clinical pharmacy services decreased from 49% in 2011 to 15% in 2016. The main reported reason for not providing clinical pharmacy services was the small number of pharmacy staff, which was commonly 1-2 pharmacists in medicine dispensaries. The reported number of clinical pharmacists and hospital units receiving clinical pharmacy services had increased during the five-year study period (Table 1). More typically they were reported to split their work time between 2-3 units both in 2011 and 2016, only a small number of the clinical pharmacists were reported to work in one unit (ward, clinic). According to the responses of the both surveys, the services were most commonly available in surgical and internal medicine wards. All five university hospitals reported having clinical pharmacy services in intensive care, pediatric and oncology units in 2016.

3.2.1 Evolution of reported tasks of clinical pharmacists

Reported tasks performed by clinical pharmacists in 2011 and 2016 are presented in Figure 3. The figure shows extension and implementation of the new tasks, most of which were related to improving

medication safety. Of the twelve reported new tasks in 2016, most widely performed were tasks assuring medication safety at the organizational level, such as developing instructions for medication use and medication therapy (91% reported), taking part in creating and updating medication safety plans (87%), taking part in multiprofessional working groups (87%) and developing medication-use processes by using data from medication error reports (78%, Figure 3). In 2016 clinical pharmacy services covered all crucial stages of the medication-use process (Figure 4). The reported major new contributions within the five years period was the new role in developing, auditing and instructing the medication use-process with the system approach,⁴⁵ conducting medication reconciliations (+63%) and counselling patients (+39%, Figure 3).

Clinical pharmacists were reported having access to patient records in almost all (96%) and access to laboratory results in the majority (83%) of the responding units in 2016 (this was not asked in 2011). The proportion of logistic tasks (e.g. ordering and stock control) remained the same (83% reported, Figure 3). In 2016, the respondents were asked to estimate how much time was spent on logistic tasks compared to other tasks. More than half (59%, n=16) of the respondents estimated that 5-50% of the time was spent on logistic tasks, while in almost one-third of the units (30%, n=8), less than 5% of the working time was used. A variation between the tasks of different clinical pharmacists was reported: some performed only logistic tasks, while others had none. Additionally, the respondents reported in an open question their perceptions about the most important tasks actually performed by the clinical pharmacists in their organization at the time of the survey: drug information to ward personnel (48%, n=13), medication reconciliation (33%, n=9), inducting ward personnel (26%, n=7), and developing the medication-use process (22%, n=6).

3.2.2 Strategy, management and future plans of clinical pharmacy services

In 2011, less than half (42%) of the responding units reported having a manager dedicated to clinical pharmacy services, while in 2016 the majority (74%) reported this (Table 1). A plan or strategy for clinical pharmacy services was reported to been devised in 20% of the responding units in 2011, while in 63% of the units in 2016 (Table 1). In 2016, half of the responding units (52%) were familiar with the European Statements of Hospital Pharmacy⁴² that could be utilized to guide the development of a strategy for hospital pharmacy services.

Both in 2011 and 2016, the most common plan for the future in the responding hospital pharmacies and medicine dispensaries was reported to be to extend the clinical pharmacy services to new care units within their healthcare organization. In 2016, almost half (44%) of the responding units reported to have a plan to re-develop and extend the clinical pharmacists' role to be more clinical and patient-oriented. Similar plans were reported already in 2011, but a need for continuing education to adopt a more patient oriented role was recognized. The use of information and automation technology was reported as a key in changing the

logistics role of clinical pharmacists in both years. In 2016, 30% of the respondents had the opinion that clinical pharmacy services should increasingly be provided in primary care, nursing homes, home care and social care units. Additionally, in 2016, almost two-thirds (62%) of the responding units thought that pharmacists could take a position as medication safety officers or coordinators in the future, while the rest (38%) had no opinion.

3.3 Reported importance of continuing education

Participation in long-term continuing education was reported to have been increased during 2011-2016 (Figure 5). Only one hospital pharmacy and one medicine dispensary reported that their clinical pharmacists had not participated in any long-term continuing education by 2016. It was perceived that the clinical pharmacists were able to use the expertise acquired through the long-term continuing education well (70% of the responding units) or slightly (30%). Almost half (48%) of the respondents thought that participating in continuing education had supported the development of the patient-centered tasks of clinical pharmacists.

3.4 Assessed benefits and outcomes of clinical pharmacy services

Of the responding units, 33% (n=9) reported having assessed the benefits and outcomes of clinical pharmacy services since 2011 (Figure 6). The results were typically reported internally to their own organization (n=7), in the national congresses (n=4) or in national scientific journals (n=2). Increased multiprofessional collaboration, saved working time of nurses and savings in drug consumption were the most commonly reported assessed and achieved benefits and outcomes in 2011 and 2016. In 2016, common patient safety benefits which were not surveyed or reported in 2011 were the increased reporting of medication errors (n=5) and increased number of accurate medication charts (n=5).

4. DISCUSSION

Responses to this national study suggest changes in the pharmacists' involvement in patient care and assuring medication safety in Finnish hospitals within a time period of five years in 2011-2016. This change can be seen in the workforce resources and tasks performed by clinical pharmacists in care units (Figure 3, Figure 4). Their contributions were reported to be extended towards interventions prioritized in international and national patient and medication safety recommendations. Also, clinical pharmacists' competences were reported to have evolved through continuing education and specialization programs towards supporting patient and medication safety initiatives (Figure 5).

These reported developments in pharmacists' performance in Finnish hospitals can be considered as result of various contributing factors. This quite fast extension of their tasks would not have been possible without the support of national patient and medication safety initiatives and guidelines,^{23-24,27,47} pharmacists' involvement in establishing these policies, and making long-term continuing education available for pharmacists with the focus on systems approach to patient and medication safety.^{38,45} The first steps in creating awareness of medication safety risks and actual errors were taken through a patient safety incident reporting system, which was implemented in Finland in 2007 in the first healthcare units, as have been recommended by international and national guidelines.^{4-7,23-24,28,47} Since then, reporting and learning from medication errors and related research have extended to more than 200 Finnish healthcare organizations, revealing medication safety risks and their characteristics, which has laid the foundation for more prospectively managing the risks.^{25,39,48} This work has facilitated the clinical pharmacists' participation in multiprofessional patient safety work, as has been suggested e.g., by the Council of Europe and EDQM.^{5-6,8-9}

The system-based actions to improve medication safety that were reported to be widely performed by clinical pharmacists in Finnish hospitals in 2016 (Figure 3) cover well the crucial stages of the medication-use process (Figure 4). The actions reported to be performed are in line with the European hospital pharmacy statements, particularly with the statements concerning pharmacists ensuring quality assurance strategies for medicine use processes (5.2), reporting of adverse drug reactions and medication errors (5.4) and ensuring that the information needed for safe medicines use, including both preparation and administration, is accessible at the point of care (5.9).⁴²

During the five years, the most notable reported increase had happened with conducting medication reconciliations, e.g., on admission (+63%), despite not being reported as a future plan in 2011. Medication reconciliation was not explicitly mentioned as a concept in patient safety and medicines policy documents published in Finland in the beginning of the 2000s.²³⁻²⁴ In many other countries and international recommendations medication reconciliation has been prioritized as one of the key strategies to prevent adverse drug events and improve patient safety at all transitions in care.^{7,49} In the United States (US), medication reconciliation was recommended already in 2005 in the Hospitals' National Patient Safety Goals established by the US Joint Commission on Accreditation of Healthcare Organizations which also established guidelines for performing medication reconciliation.⁵⁰ In Europe, medication reconciliation has been prioritized e.g., by the second European Union (EU) patient safety and quality program (PASQ).¹¹ Despite recommendations and guidelines, medication reconciliation practices are challenging to perform and EAHP evaluated that it was the most poorly implemented statement (4.4) in Europe in 2015.^{42,51} The reasons for this were that pharmacists usually had no access to patient information systems or direct

contact to patients. In our survey in 2016, clinical pharmacists were reported to have access to patient records in almost all (96%) responding units, which is in line with the European hospital pharmacy statements (statement 4.3).⁴² Pharmacists should also ensure accurate recording of all allergy and other relevant medicine-related information in the patient's health record (5.8).⁴² The importance of reconciled medication charts has been identified recently in Finland in the Rational Pharmacotherapy Action Plan 2018-2022 to be taken into account in the ongoing social and healthcare reform.^{26,52}

A positive development was reported in strategic planning and managing clinical pharmacy services in hospitals. However, the content and quality of clinical pharmacy services are not uniform even inside the same organization. More than half of the responding units (52%) reported being familiar with the European Statements of Hospital Pharmacy⁴² in 2016. The Statements could be utilized to standardize the content and availability of clinical pharmacy services. Common future plans that were reported related to changing the focus of clinical pharmacists' role on patient-oriented tasks instead of drug logistics. Automation technology (e.g., automated dispensing systems) which is arriving in Finnish hospitals, was expected to release clinical pharmacists' time from logistic tasks to providing pharmaceutical care services that improve medication safety.⁵³ Furthermore, the Finnish healthcare reform⁵² will enable the reform of current legislation⁵⁴ related to the number of hospital pharmacies with overlapping responsibilities.⁵³ This will also release hospital pharmacy staff for patient care. It is crucial to be prepared with clinical pharmacy skills to be able to provide pharmaceutical care at this point.

Pharmacists' participation in long-term continuing education, related to pharmaceutical care and system-based medication safety work, was reported to be increased during the five years (Figure 5). The majority (70 %) of the respondents reported that they are able to satisfactorily use their expertise achieved from long-term continuing education and almost half (48 %) of the respondents thought that continuing education had helped them to adopt a more patient-oriented role. The history of long-term continuing education of clinical pharmacy and medication safety is fairly short in Finland: during the first decade of the 21st century, the Faculty of Pharmacy in the University of Helsinki started systematic research and education about patient and medication safety issues. Clinical pharmacy oriented hospital pharmacy specialization program has been available since 2010.^{31,55} Post-graduate accreditation training for comprehensive medication review (CRM) started in 2005.^{37,56} Later also a shorter, one-year training for expertise in medication reviews and accreditation training for expertise in ward pharmacy has been available. The post-graduate clinical pharmacy specialization and accreditation training have facilitated the shift of clinical pharmacists' tasks from drug logistics to patient-centered work. Furthermore, the education of basic degrees in pharmacy is under reform to meet the growing need for clinical pharmacy skills. The latter is also addressed in the European hospital pharmacy statement 6.1.⁴²

The relative proportion of responding organizations which reported having evaluated the benefits or outcomes of clinical pharmacy services had increased from 16 % to 33% during 2011-2016. According to the respondents, the most common evaluated and achieved benefits in 2016 were related to the work of nurses e.g. saved their working time, improved their pharmacotherapy skills and increased their collaboration with pharmacists (Figure 6). Also, savings in drug consumption, increased number of accurate medication charts and increased medication error reporting were common. However, only a few organizations had published their results nationally and international publications were missing. This area needs development, as is also pointed out in the European hospital pharmacy statements (6.4)⁴² and in the national Rational Pharmacotherapy Action Plan.⁵⁷ Furthermore, documenting clinical pharmacy interventions for the patient's health record, according to the European hospital pharmacy statement 4.3⁴² enables more effective outcomes research related to clinical pharmacy services' impact on e.g. readmissions, treatment periods and mortality. Hospital pharmacists should be encouraged and educated for measuring and studying outcomes of clinical pharmacy services to achieve more rigorous evidence.

4.1 Strengths and limitations

The results of this national study can be generalized for hospital inpatient care in Finland even though the overall response rates were moderate (60% in 2011 and in 52% in 2016). Despite the moderate response rates, the coverage of the responses in terms of the coverage of the largest inpatient units with hospital pharmacies were 83% in 2011 and 75% in 2016. The survey method was applicable to study national development for strategic management purposes as in other follow-up survey studies in US¹⁹ and Europe²², even though it has methodical limitations e.g. compared to using actual performance data or observation method. The target group of the survey was knowledgeable for providing data of the recent developments and the status of the clinical pharmacy services. Addressing the survey to all hospital clinical pharmacists would be interesting in the future. Clinical pharmacy services' impact on patient care outcomes should also be followed up with more rigorous methods.

4.2 Clinical and practical implications

Evolution of clinical pharmacy services to ensure medication safety and their impact on patient care outcomes should be followed-up regularly also in the future. In 2016, more than half (62%) of the responding organizations thought that pharmacists could be working as medication safety officers in the future. The first post for a medication safety officer (pharmacists) was launched in Finland in 2017 in the Helsinki University Hospital. A national focal point for coordinating medication safety research, practice and competence development should be established^{26,58-59} as has been recommended by the Council of Europe already in 2006⁵⁻⁶, and repeated by other key documents guiding patient and medication safety work.

5. CONCLUSIONS

Pharmacists' involvement in patient care and system-based medication safety work was reported to become more common and planned in Finnish hospitals during 2011-2016. This development is in line with international and national system-based patient safety guidelines and policy initiatives and should be continued. Availability of patient-centered and system-based continuing education and accreditation training has had important impact in this shift towards patient-oriented services.

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Table 1. Clinical pharmacy services in hospital pharmacies and medicine dispensaries responding the surveys in 2011 (n=71/118) and 2016 (n=27/52). It should be noted, that the total number of medicine dispensaries has remarkably decreased during 2011-2016 in Finland, while the number of hospital pharmacies has remained the same.

Clinical pharmacy services	2011 (n=71) n (%)	2016 (n=27) n (%)
Responding units not providing clinical pharmacy services	35 (49%)	4 (15%)
Responding units providing clinical pharmacy services	36 (51%)	23 (85%)
- hospital pharmacies	16 (44%)	17 (74%)
- medicine dispensaries	20 (56 %)	6 (26%)
Reported number of full-time* working clinical pharmacists	103	134-215**
Reported number of part-time working clinical pharmacists	54	13-65**
Reported number of hospital units receiving full-time* clinical pharmacy services	108	179-201**
Reported number of hospital units receiving part-time clinical pharmacy services	134	192-236**
Responding units having a manager, whose working time was dedicated to management of clinical pharmacy services	30 (42%)	20 (74%)
Responding units having a plan or strategy for clinical pharmacy services	14 (20%)	17 (63%)

*Full-time = office hours from 8:00 a.m. to 4:00 p.m. during week days.

**Ranges were used in the 2016 survey and actual numbers were asked in the 2011 survey.

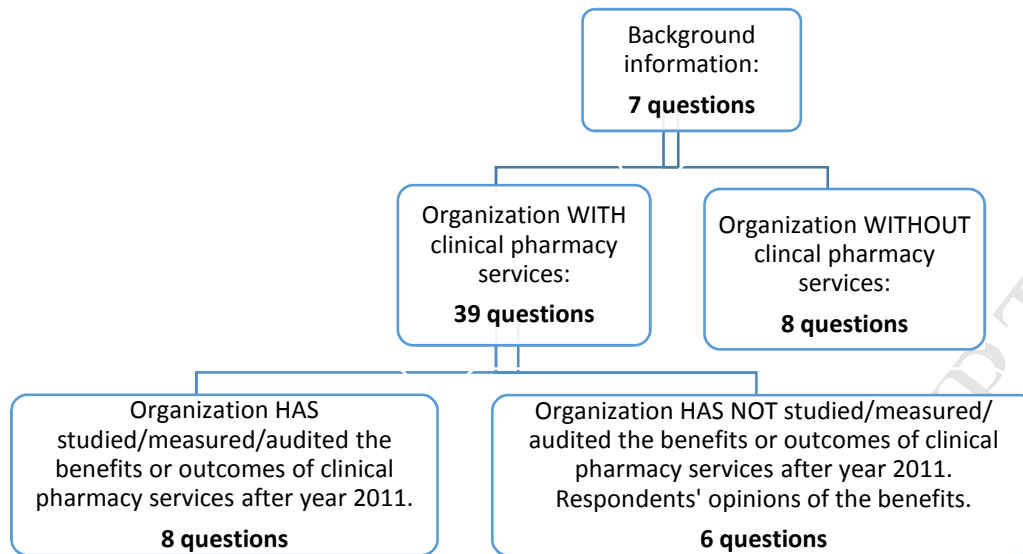


Figure 1. Content of the survey instrument in 2016.

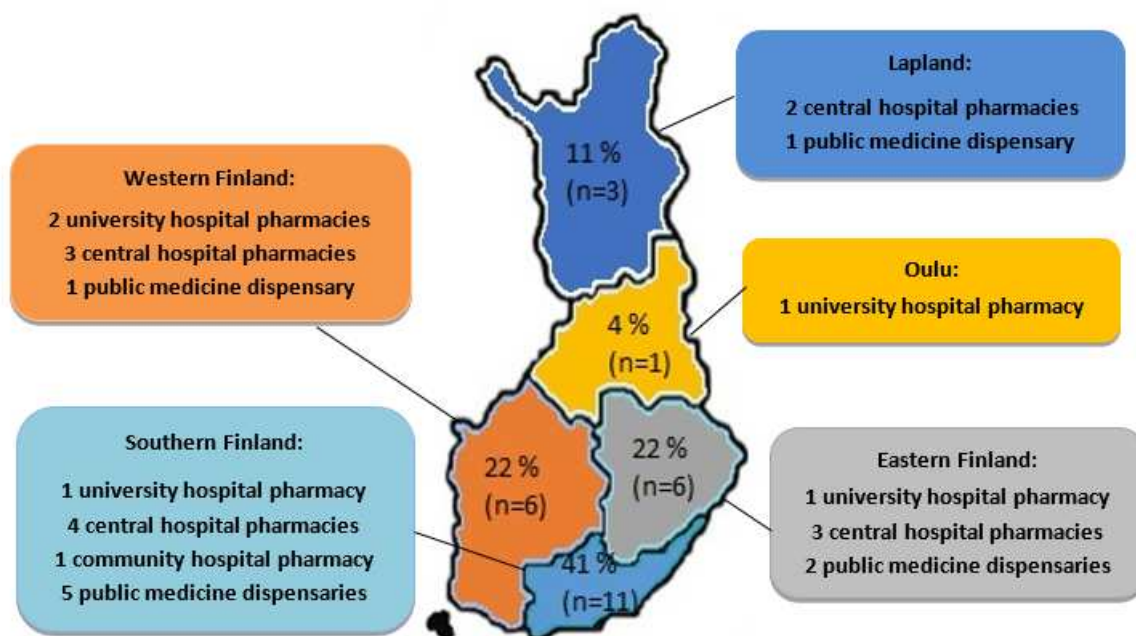


Figure 2. Location of the hospital pharmacies and medicine dispensaries that responded to the survey in 2016 (n=27/52) by county.

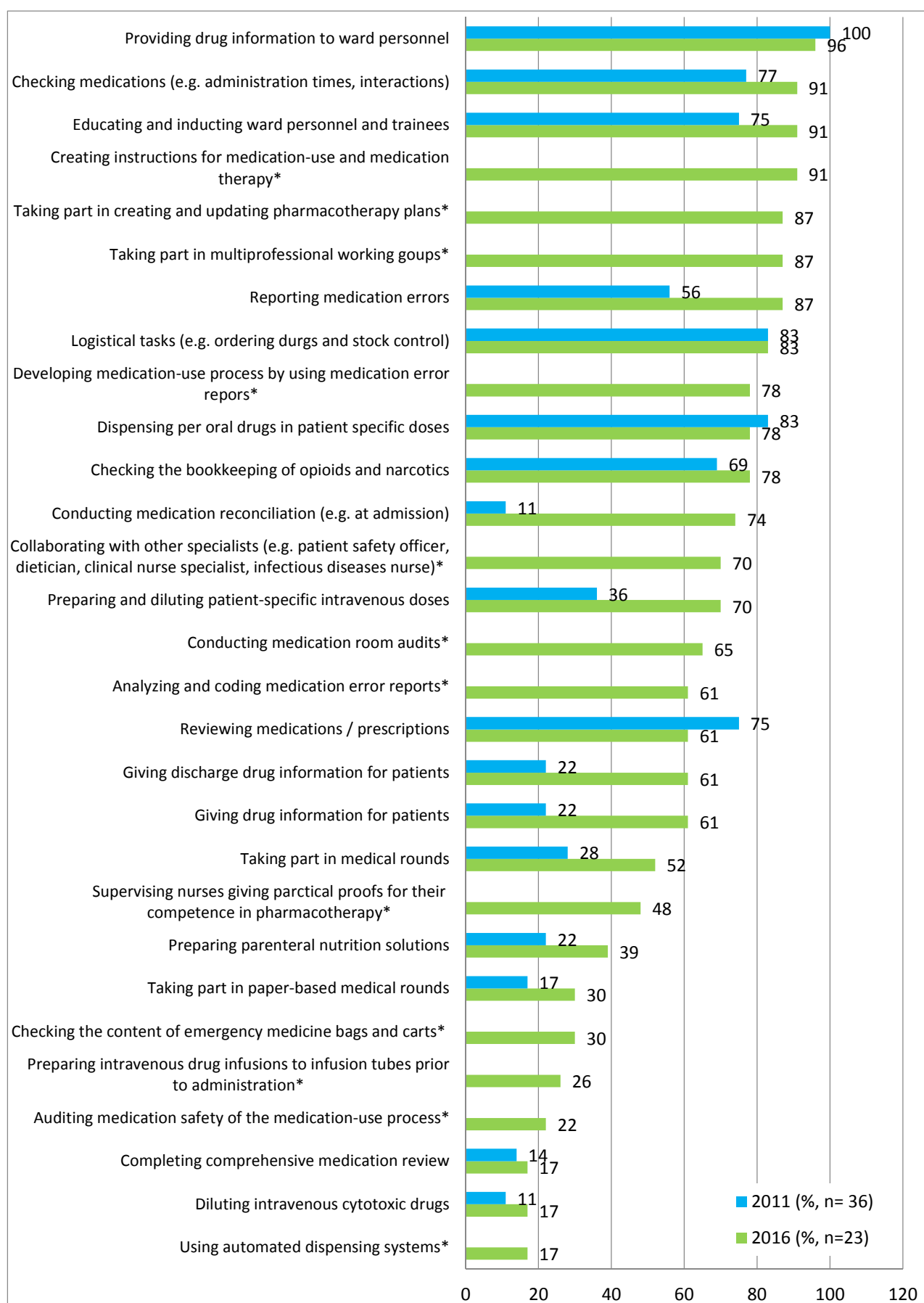


Figure 3. Reported tasks of clinical pharmacists (%) in 2011 and 2016. *New tasks (n=12) added to the year 2016 survey.

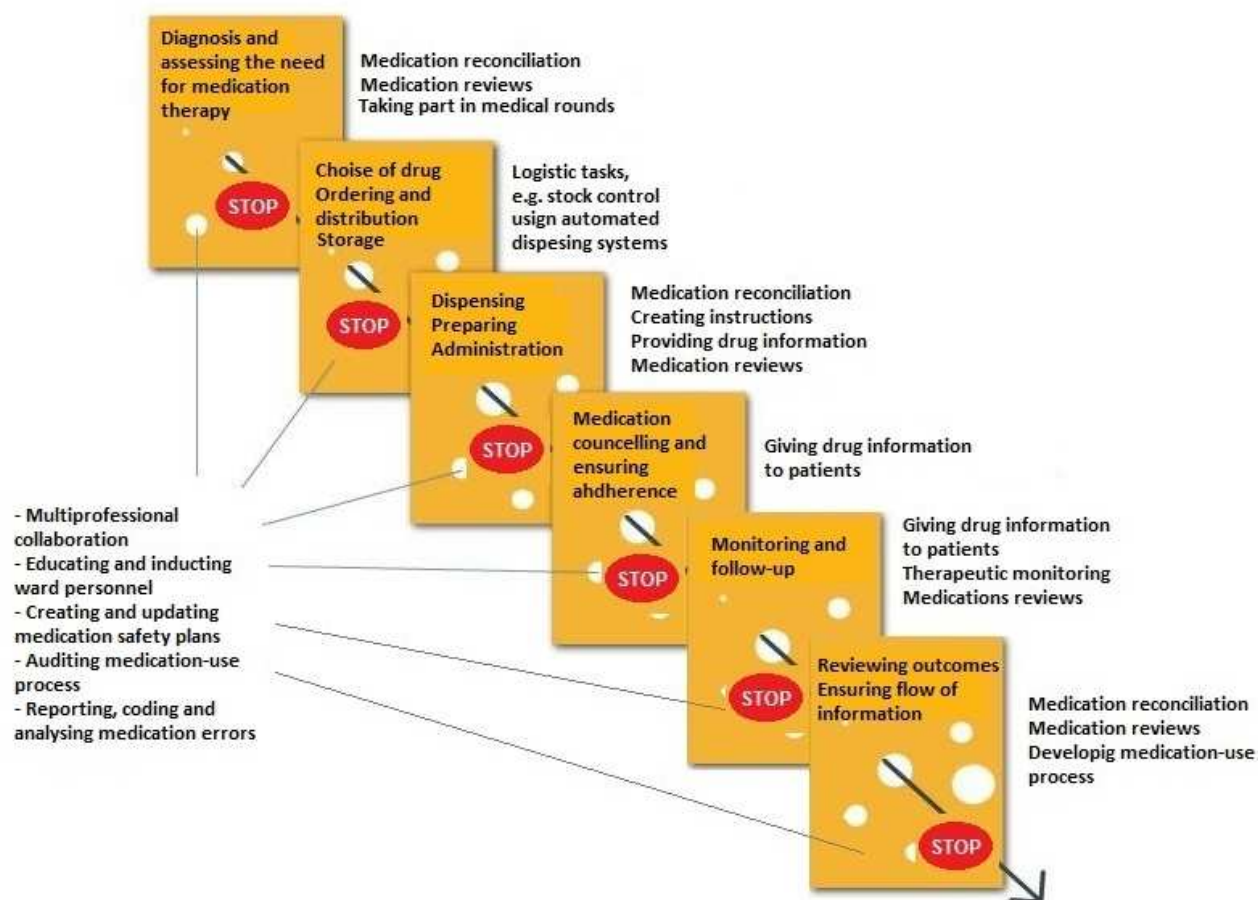


Figure 4. Illustration of the evolution of the tasks of the clinical hospital pharmacists in Finland by 2016 as reported by the responding hospital pharmacies and medicine dispensaries. The figure illustrates the coverage of the clinical pharmacy services of the stages of medication use process by applying Reason's Swiss Cheese Model.⁴⁵

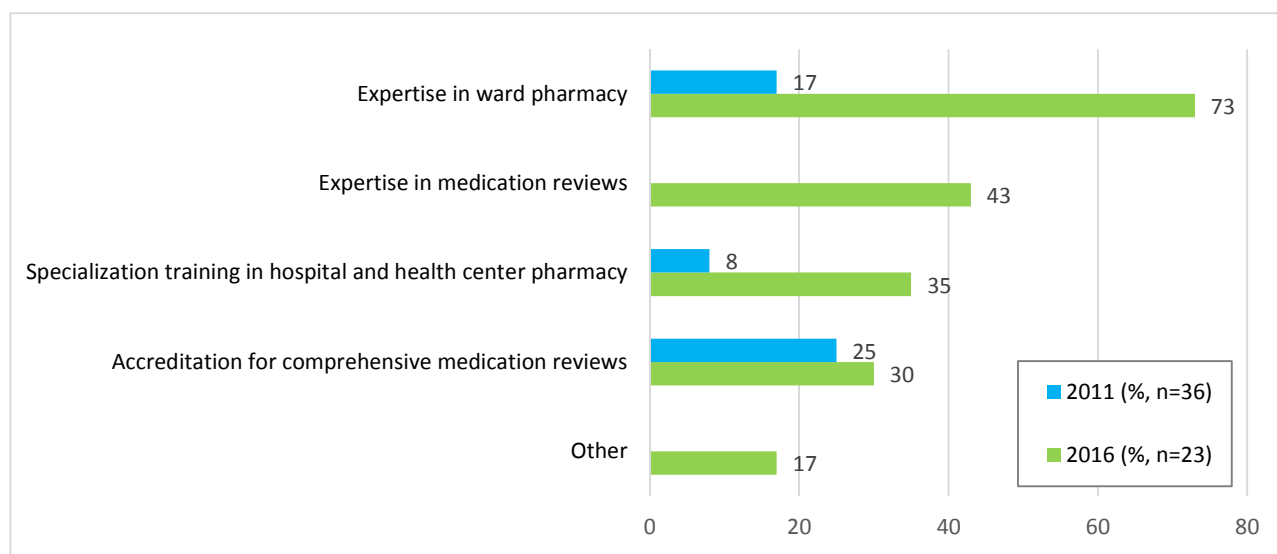


Figure 5. Participation in long-term continuing education and accreditation training of one or more of the clinical pharmacists in the responding units (%). Other (n=4): expertise in patient safety (n=2), master of clinical pharmacy (n=1), hospital's internal continuing education program (n=1). Training for expertise in medication reviews was not yet provided in 2011.



Figure 6. Benefits and outcomes of clinical pharmacy services that were reported to been assessed and achieved in 33% (n=9/27) of the responding units in 2016.